Scientific Excellence • Resource Protection & Conservation • Benefits for Canadians
Excellence scientifique • Protection et conservation des ressources • Bénéfices aux Canadiens

Review of Shellfish Fisheries in Northern British Columbia 1987 and 1988

G. Thomas and S. Farlinger

Fisheries Branch
Department of Fisheries and Oceans
Prince Rupert, B.C. V8J 1G8

February 1992

Canadian Manuscript Report of Fisheries and Aquatic Sciences No. 2144

Fisheries and Oceans Pêches et Océans

Canada

Canadian Manuscript Report of Fisheries and Aquatic Sciences

Manuscript reports contain scientific and technical information that contributes to existing knowledge but which deals with national or regional problems. Distribution is restricted to institutions or individuals located in particular regions of Canada. However, no restriction is placed on subject matter, and the series reflects the broad interests and policies of the Department of Fisheries and Oceans, namely, fisheries and aquatic sciences.

Manuscript reports may be cited as full publications. The correct citation appears above the abstract of each report. Each report is abstracted in *Aquatic Sciences and Fisheries Abstracts* and indexed in the Department's annual index to scientific and technical publications.

Numbers 1–900 in this series were issued as Manuscript Reports (Biological Series) of the Biological Board of Canada, and subsequent to 1937 when the name of the Board was changed by Act of Parliament, as Manuscript Reports (Biological Series) of the Fisheries Research Board of Canada. Numbers 901–1425 were issued as Manuscript Reports of the Fisheries Research Board of Canada. Numbers 1426–1550 were issued as Department of Fisheries and the Environment, Fisheries and Marine Service Manuscript Reports. The current series name was changed with report number 1551.

Manuscript reports are produced regionally but are numbered nationally. Requests for individual reports will be filled by the issuing establishment listed on the front cover and title page. Out-of-stock reports will be supplied for a fee by commercial agents.

Rapport manuscrit canadien des sciences halieutiques et aquatiques

Les rapports manuscrits contiennent des renseignements scientifiques et techniques qui constituent une contribution aux connaissances actuelles, mais qui traitent de problèmes nationaux ou régionaux. La distribution en est limitée aux organismes et aux personnes de régions particulières du Canada. Il n'y a aucune restriction quant au sujet; de fait, la série reflète la vaste gamme des intérêts et des politiques du ministère des Pêches et des Océans, c'est-à-dire les sciences halieutiques et aquatiques.

Les rapports manuscrits peuvent être cités comme des publications complètes. Le titre exact paraît au-dessus du résumé de chaque rapport. Les rapports manuscrits sont résumés dans la revue *Résumés des sciences aquatiques et halieutiques*, et ils sont classés dans l'index annuel des publications scientifiques et techniques du Ministère.

Les numéros 1 à 900 de cette série ont été publiés à titre de manuscrits (série biologique) de l'Office de biologie du Canada, et après le changement de la désignation de cet organisme par décret du Parlement, en 1937, ont été classés comme manuscrits (série biologique) de l'Office des recherches sur les pêcheries du Canada. Les numéros 901 à 1425 ont été publiés à titre de rapports manuscrits de l'Office des recherches sur les pêcheries du Canada. Les numéros 1426 à 1550 sont parus à titre de rapports manuscrits du Service des pêches et de la mer, ministère des Pêches et de l'Environnement. Le nom actuel de la série a été établi lors de la parution du numéro 1551.

Les rapports manuscrits sont produits à l'échelon régional, mais numérotés à l'échelon national. Les demandes de rapports seront satisfaites par l'établissement auteur dont le nom figure sur la couverture et la page du titre. Les rapports épuisés seront fournis contre rétribution par des agents commerciaux.

Canadian Manuscript Report of

Fisheries and Aquatic Sciences No. 2144

February 1992

REVIEW OF SHELLFISH FISHERIES IN NORTHERN BRITISH COLUMBIA DURING 1987 AND 1988

G. Thomas and S. Farlinger

Department of Fisheries and Oceans

Prince Rupert, B.C.

V8J 1G8

92-07485/

(c) Minister of Supply and Services Canada 1992
Cat No. Fs 97-4/2144E ISSN 0706-6473

Correct citation for this publication:

Thomas, G., and S. Farlinger. 1992. Review of shellfish fisheries in northern British Columbia during 1987 and 1988. Can. Manuscr. Rep. Fish. Aquat. Sci. 2144: 44 p.

CONTENTS

List of Figures..... iv

List of Tables..... iv

List of Appendices..... vi

Abstract / Resume..... vii

Introduction..... 1

Intertidal Clam Fishery..... 1
Species Harvested..... 1
Regulations..... 1
Landings..... 5

Goose Barnacle Fishery..... 5
Regulations..... 5
Landings..... 5

Crab Fishery..... 5
Species Harvested..... 5
Regulations..... 8
Landings..... 8

Geoduck Fishery..... 8
General..... 8
Regulations..... 11
Landings..... 11

Octopus Fishery..... 17
Regulations..... 17
Landings..... 17

Scallop Fishery..... 17
Species Harvested..... 17
Regulations..... 17
Landings..... 17

Squid Fishery..... 19
Regulations..... 19
Landings..... 19

Sea Urchin Fishery..... 19
Species Harvested..... 19
Regulations..... 19
Landings..... 19

Sea Cucumber Fishery..... 23
Regulations..... 23
Landings..... 23

Shrimp Fishery..... 23
Shrimp Fishery by Trap..... 23
Species Harvested..... 23
Regulations..... 23
Landings..... 27

Shrimp Fishery by Trawl..... 27
Species Harvested..... 27
Regulations..... 27
Landings..... 27

Abalone Fishery..... 31
General..... 31
Regulations and Surveys..... 31
Landings..... 31

Acknowledgements..... 33

References..... 34

Appendices..... 36

LIST OF FIGURES

Figure

1. Location of Statistical Areas in Northern British Columbia..... 2

2. Location of Statistical Areas in British Columbia.. 3

LIST OF TABLES

Table

1. Landings and Estimated Value of Shellfish Fisheries in Northern B.C., 1987-1988..... 4

2. Number of Licensed Vessels and Their Utilization in Shellfish Fisheries in B.C., 1987-1988..... 4

3. Annual Landings (kg) of Razor Clams in Statistical Area 1..... 6

4. Clam Landings in B.C., 1987 and 1988..... 6

5. Goose Barnacle Landings (kg) by Statistical Area in Northern B.C., 1987 and 1988..... 7

6. Crab Landings (kg) by Month and Statistical Area in Northern B.C., 1987..... 9

7. Crab Landings (kg) by Month and Statistical Area in Northern B.C., 1988..... 10

8. Geoduck quotas by Management Area in the North Coast for 1987 and 1988..... 12

9. Annual Geoduck Quotas in Northern B.C., 1980-1988.. 13

10. Geoduck Landings (kg) by Statistical Area in Northern B.C., 1987 and 1988..... 14

11. Annual Geoduck Landings by Statistical Area in Northern B.C., 1980-1988..... 14

12. Geoduck Landings (kg) by Month and Statistical Area in Northern B.C., 1987..... 15

13. Geoduck Landings (kg) by Month and Statistical Area in Northern B.C., 1988..... 16

14. Octopus Landings (kg) by Statistical Area and Gear Type in Northern B.C., 1987..... 18

15. Octopus Landings (kg) by Statisical Area and Gear Type in Northern B.C., 1988..... 18

16. Squid Landings (kg) by Statistical Area and Gear Type in Northern B.C., 1987 and 1988..... 20

17. Red Sea Urchin Landings (kg) by Month and Statistical Area in Northern B.C., 1987..... 21

18. Red Sea Urchin Landings (kg) by Month and Statistical Area in Northern B.C., 1988..... 22

19. Sea Cucumber Landings (kg) by Month and Statistical Area in Northern B.C., 1987..... 24

20. Sea Cucumber Landings (kg) by Month and Statistical Area in Northern B.C., 1988..... 25

21. Commercial Sampling for Northern B.C. Shrimp Trap Fishery, 1987 and 1988..... 26

22. Annual Landings (tonnes) and Effort for Shrimp Trap Fishery in B.C., 1981-1988..... 28

23. Annual Landings (tonnes) and Effort for Shrimp Trawl Fishery in B.C., 1981-1988..... 28

24. Shrimp Trap and Trawl Landings (kg) by Statistical Area in Northern B.C., 1987..... 29

25. Shrimp Trap and Trawl Landings (kg) by Statistical

Area in Northern B.C., 1988..... 30

26. Range in Abalone Landings per Licence Holder in B.C., 1987 and 1988..... 32

27. Abalone Landings (kg) by Statistical Area (1-27) in B.C., 1987 and 1988..... 32

LIST OF APPENDICES

Appendix

1. North Coast Commercial Crab Closures, 1987-1988.... 36

2. Annual Total Abalone Landings in B.C., 1952-1988... 37

Append. Fig. 2-1. Annual B.C. Abalone Catch, 1952-1988.... 38

3. Mean Annual Abalone Catch per Vessel and Diver, and Fishing Effort (from harvest logbooks), 1977-1988.. 39

4. Annual Abalone Port Sampling Summary, Prince Rupert, B.C., 1987-1988..... 40

5. Annual Abalone Landings (kg) (from harvest logbooks) by Statistical Area in B.C., 1977-1988..... 41

6. Annual Abalone Fishing Effort by Statistical Area (from harvest logbooks) in B.C., 1977-1988..... 42

Append. Fig. 6-1. Annual Abalone CPUE, 1977-1988..... 44

ABSTRACT

Thomas, G., and S. Farlinger. 1992. Review of shellfish fisheries in northern British Columbia during 1987 and 1988. Can. Manuscr. Rep. Fish. Aquat. Sci. 2144: 44 p.

This report documents the landings, licensing and management strategies for shellfish fisheries in northern British Columbia (north of Cape Caution) during 1987 and 1988, as well as the history of the fisheries. Annual shellfish landings during 1987 and 1988 were valued at 6.6 and 10.1 million dollars, respectively.

Key words: shellfish fisheries in northern British Columbia, history, management, catches.

RESUME

Thomas, G., and S. Farlinger. 1992. Review of shellfish fisheries in northern British Columbia during 1987 and 1988. Can. Manuscr. Rep. Fish. Aquat. Sci. 2144: 44 p.

Ce rapport traite des prises debarquees, de l'octroir des permis et des modes de gestion relatifs auz peches coquilleres du nord de la Colombie-Britannique, soit au nord du cap Caution, au cours des annees 1987 et 1988. Il fait aussi l'historique des peches. Les prises debarquees en 1987 et 1988 representaient les sommes respectives de 6.6 et 10.1 millions de dollars.

Mots-cles: peches coquilleres au nord de la Colombie-Britannique, historique, gestion, quantities pechees.

This report is the third in a series documenting the history, regulations, and landings of shellfish fisheries in northern British Columbia. This report was preceded by four reports for abalone (Fedorenko and Sprout, 1982; Sprout, 1983; Bates, 1984, 1985) and two reports for all shellfish species (Farlinger and Bates, 1985; Farlinger and Thomas, 1988).

Annual landings and participation in shellfish fisheries are expanding rapidly in northern B.C.. For example, the number of active licences in the northern B.C. crab fishery doubled between 1985 and 1987 while the number of active prawn vessels has increased four times (Table 2). Total landings in northern B.C. have increased annually from 2,000 t in 1985 to 3,600 t in 1987 and 4,000 t in 1988 (Table 1). There has been a corresponding increase in total landed value for these fisheries from $3.6 million in 1985 to $6.7 million in 1987 and $10.1 million in 1988. Expansion of these fisheries can be attributed not only to increases in the number of participants and their production in existing fisheries, but to the introduction of new fisheries, such as sea cucumber and red sea urchin.

Management of B.C. shellfish fisheries is effected through Fisheries licensing, regulations, and conditions of licence, communicated to fishermen in management plans. Management plans are developed annually by the Shellfish Working Group with the aid of stock assessment advice from the Pacific Stock Assessment Review Committee and fishermen's advice from Sectoral Committees. Annual licensing requirements, regulations, and landings for each shellfish fishery are provided below. Landings are derived from sales slips, unless otherwise stated, and are expressed in Metric units. Figure 1 illustrates Fisheries Statistical Areas making up northern B.C., while northern and southern Statistical Areas are given in Figure 2.

INTERTIDAL CLAM FISHERY

SPECIES HARVESTED

Harvested species of clam in B.C. include butter clams (Saxidomus giganteus), native and Japanese littlenecks (Protothaca stamina and Venerupis japonica), and razor clams (Siliqua patula). Occassionally the cockle (Clincardium nuttalli) and the horse clam (Tresus capax) enter the commercial catch.

REGULATIONS

North coast waters are closed for bivalve harvest, except for razor clams, because of the risk of PSP poisoning. These species can be harvested if an adequate PSP detection program is established before and during harvest, and the clams are delivered to a registered shellfish plant.

Size limits are 63 mm for butter clams, 38 mm for littleneck and manila clams, and 90 mm for razor clams.

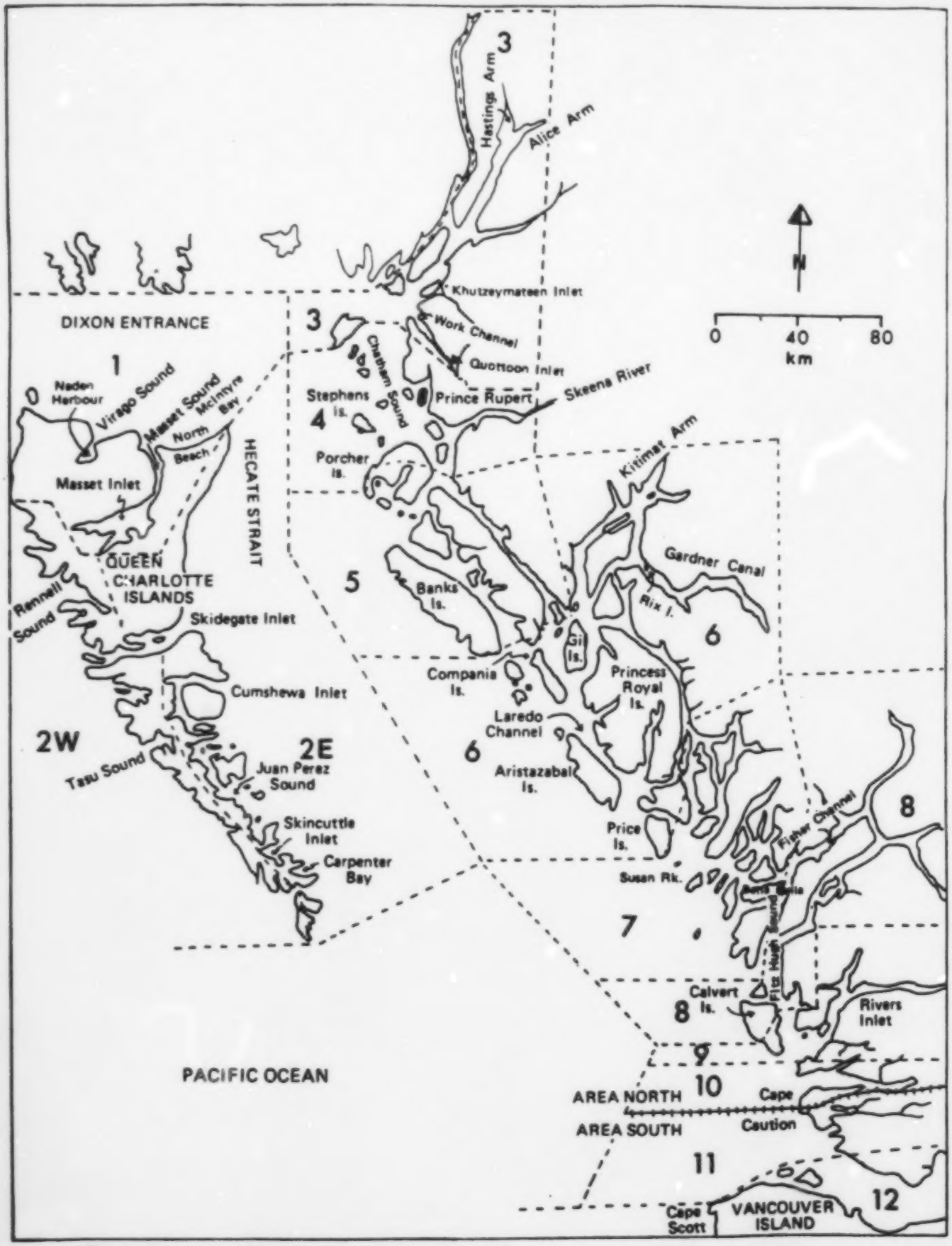


Fig. 1. Location of Statistical Areas in northern B.C.

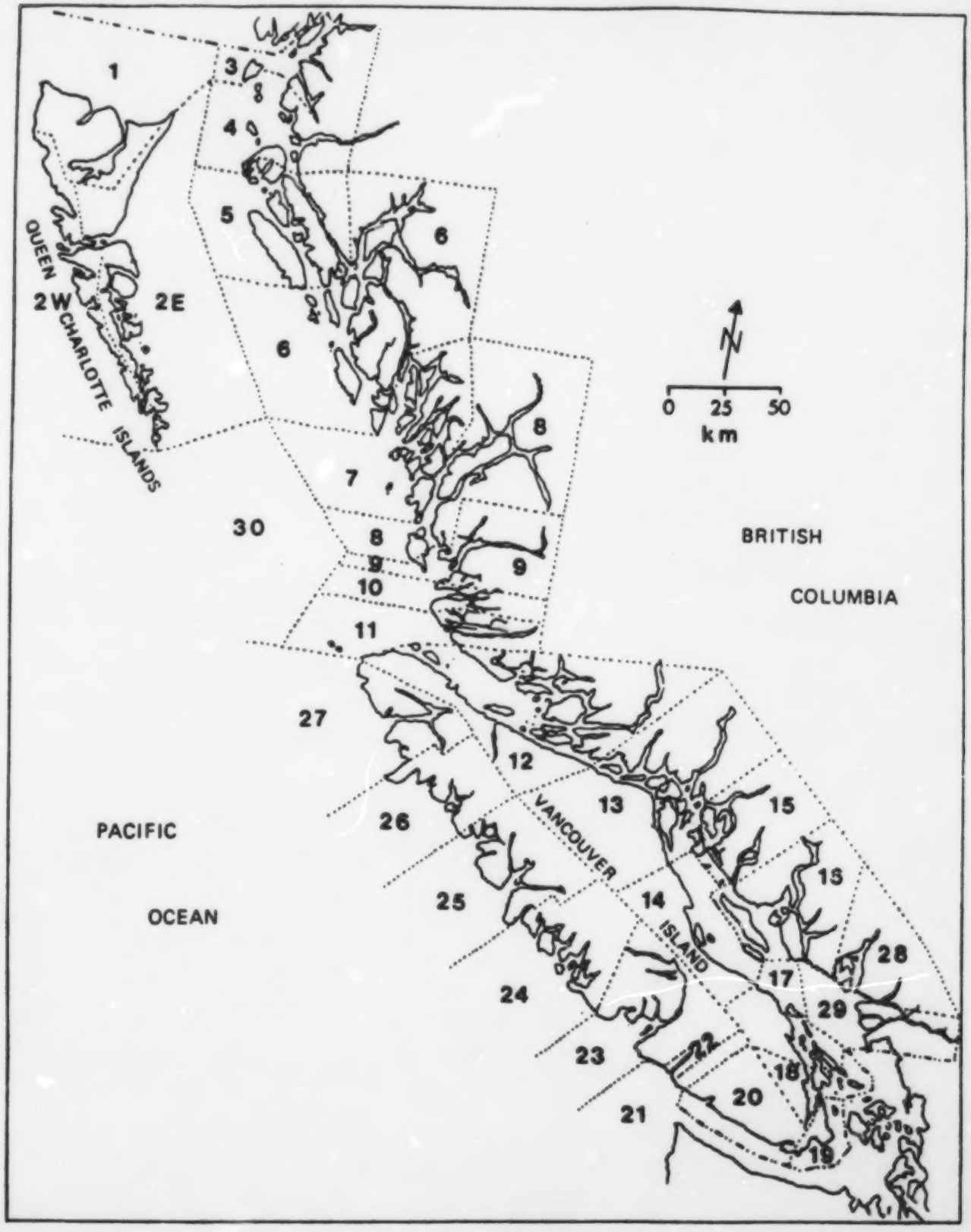


Fig. 2. Location of Statistical Areas in British Columbia.

Table 1. Landings and estimated value of shellfish fisheries in northern B.C., 1987 and 1988.

Species	Annual landings (kg)		% of total landings		$ value (x1000)		$/kg	
	1987	1988	1987	1988	1987	1988	1987	1988
Geoduck	2,148,067	2,026,081	58.6	49.8	1,911.8	4,072.4	$0.89	$2.01
Crab	392,940	520,364	10.7	12.8	1,572.5	2,154.2	$4.00	$4.14
Prawn	158,775	234,342	4.3	5.8	1,206.5	2,020.5	$7.60	$8.62
Abalone*	46,402	45,483	1.3	1.1	759.5	1,006.1	$16.37	$22.12
Sea Cucumbers	421,690	579,619	11.5	14.2	189.8	295.6	$0.45	$0.51
Sea Urchin	293,474	437,057	8.0	10.7	141.0	187.9	$0.48	$0.43
Razor Clams**	133,687	155,393	3.6	3.8	118.8	137.5	$0.89	$0.88
Shrimp	41,676	26,151	1.1	0.6	619.6	108.2	$14.87	$4.14
Octopus	27,600	40,528	0.8	1.0	56.9	98.2	$2.06	$2.42
Goose Barnacles	39	1,225	0.0	0.0	0.3	11.2	$7.69	$9.14
Squid	268	2,871	0.0	0.1	0.6	3.9	$2.24	$1.36
Horse Clams	230	799	0.0	0.0	0.1	0.6	$0.43	$0.75
Scallop		53	0.0	0.0	0.0	0.2		$3.77
Total	3,664,848	4,069,966			6,577.5	10,096.6	$1.79	$2.48

*Harvest log Data **Landings supplied by L. Enderud, DFO, Masset

Table 2. Number of licenced vessels and their utilization in shellfish fisheries in B.C., 1987 and 1988.

Shellfish Species	No. of eligible or issued licences		No. licences with landings		No. licences with northern BC landings		Licence category required
	1987	1988	1987	1988	1987	1988	
Crab	6,510	6,503	369	340	64	59	C licence and A,G,K,L,N,S,T
Prawn	698	677	216	288	59	72	Z licence no limited entry
Shrimp	248	249	217	216	36	37	S licence, limited entry
Abalone	26	26	26	26	21	24	E licence, limited entry
Geoduck	55	55	55	55	29	39	G licence, limited entry
Horse Clams	55	55	27	33	-	6	G licence, limited entry
Squid	69	72	8	11	2	3	Z licence, no limited entry
Octopus	167	188	150	150	59	61	Z licence, with or without vessel, no limited entry, also incidental catch
Scallop							Z licence, no limited entry, also incidental catches
Weathervane	5	5	-	-	-	-	
Pink & Spiny	29	34	10	15	-	-	
Red Sea Urchin	184	184	97	85	16	26	Z licence, no limited entry
Sea Cucumbers	151	160	56	80	19	30	Z licence, no limited entry

A personal commercial fishing licence only is required to fish intertidal clams by hand digging. Because the fishery is loosely regulated, participation in the fishery is difficult to determine.

LANDINGS

Quayle and Bourne (1972) provide clam landings prior to 1970. Until the PSP closure in 1963, northern B.C. contributed 50% to 75% to the recorded catch (razor, butter, and littleneck) in B.C.. The razor clam fishery in area 1 is the only remaining intertidal clam fishery in the north coast. Annual landings of 134 t in 1987 and 152 t in 1988 were well above the decade average (Table 3) but accounted for less than 4% of total intertidal clam landings in B.C. (Table 4). B.C. razor clams are sold primarily as bait, though razor clams in Washington state are a highly prized food item.

GOOSE BARNACLE FISHERY

REGULATIONS

Goose Barnacles are patchily distributed within the intertidal zone in exposed locations. The animals are harvested live by scraping or chipping clusters from the attached substrate. A personal commercial fishing licence and a "Z" category 6 licence for fishing without a vessel are required to participate in the fishery.

LANDINGS

Table 5 gives north coast landings by area for 1987 and 1988. North coast landings were negligible in 1987 and 1.2 t in 1988.

CRAB FISHERY

SPECIES HARVESTED

The most important crab species harvested in B.C. is the Dungeness Crab (Cancer magister) though small amounts of king crab (Paralithodes camtschatica and Lithodes aequispina) are also landed in the north coast. As well, the red rock crab and the graceful crab (Cancer productus and C. gracilis) are licensed for commercial harvest. Tanner crab (Chionocoectes sp) are harvested under the authority of an experimental permit.

Table 3. Annual landings (kg) of Razor Clams in statistical area 1.

Year	Landings (kg)
1979	100,747
1980	75,020
1981	16,404
1982	40,835
1983	19,964
1984	102,994
1985	98,605
1986	139,848
1987	133,687
1988	155,393
Mean	88,350

Note: 1979 to 1986 data from L. Enderud, DFO, Masset.
1987 and 1988 data from D. Burnip, DFO, Masset.

Table 4. Clam landings in B.C., 1987 and 1988.

Stat Area	Species	Catch (kg) in 1987	% B.C. Catch 1987	Catch (kg) in 1988	% B.C Catch 1988
1	Razor Clam	133,687	3.1	151,900	3.4
B.C.	Razor Clam	133,687	3.1	155,393	3.4
B.C.	Butter Clam	64,772	1.5	134,607	3.0
B.C.	J. Littleneck	3,594,133	84.5	3,908,831	86.6
B.C.	N. Littleneck	372,709	8.8	289,856	6.4
B.C.	Mixed	86,585	2.0	27,172	0.6
B.C.	Total	4,251,886	100.0	4,515,859	100.0

Note: Area 1 landings supplied by D. Burnip, DFO, Masset.

Table 5. Goose Barnacle landings (kg) by statistical area in northern B.C., 1987 and 1988.

Statistical Area	1987 Total Landings	1987 % Total	1988 Total Landings	1988 % Total
1	0	0.0%	0	0.0%
2E	0	0.0%	12	1.0%
2W	0	0.0%	242	19.8%
Q.C.I. Total	0	0.0%	254	20.7%
3	0	0.0%	0	0.0%
4	0	0.0%	0	0.0%
5	39	100.0%	0	0.0%
P.R. Total	39	100.0%	0	0.0%
6	0	0.0%	0	0.0%
7	0	0.0%	103	8.4%
8	0	0.0%	133	10.9%
9	0	0.0%	0	0.0%
10	0	0.0%	735	60.0%
C.C. Total	0	0.0%	971	79.3%
N.C. Total	39		1,225	
% of BC Total	0.1%		2.8%	
B.C. Total	31,594		43,399	

REGULATIONS

The primary basis for management of the dungeness crab fishery remains the minimum size limit of 165 mm. Gear restrictions, including 100 mm escape ports for traps, and seasonal closures in some locations during the softshell period are also imposed on the fishery. A considerable portion of the north coast has been closed to commercial fishing as an allocation to Indian food and sport fisheries (see Appendix 1 for a list of closed areas). For red rock crab, a minimum size limit of 115 mm is in effect. A minimum size limit of 181 mm carapace width recommended for king crab (Jewett, Sloan, and Somerton, 1985) has not been implemented.

Any vessel with a "C" licence or a licence with inherent "C" priveleges (A, G, K, L, N, S, and T) is permitted to harvest crab by trap. As a result, over 6500 licences are eligible to fish crab in B.C., though only 5% to 10 % of these have recorded landings (Table 2).

LANDINGS

A review of the history of the crab fishery in B.C. will be provided by Butler (in press). Coastwide landings averaged 1500 t to 1800 t in the 1950's and 1960's, supported by high catches in the northern Queen Charlotte Islands area, but declined dramatically in the 1970's. The Queen Charlotte area (areas 1 and 2E) and secondarily the Skeena estuary in area 4, remain the primary fishing areas in the north coast. Landings totalled 393 t and 520 t in 1987 and 1988 of which 60% to 70% originated from the Queen Charlotte Islands (Tables 6 and 7). The number of vessels fishing crab in the north coast declined slightly from 64 in 1987 to 59 in 1988 (Table 2). The crab fishery ranked second in value amoung north coast shellfish fisheries, valued at $1.6 million in 1987 and $2.1 million in 1988.

The sport fishery for crab is likely substantial around north coast communities and increasingly in the vicinity of sport fish camps such as in Naden Harbour in area 1. Crab remain an important source of food for Indians residing in the numerous villages in the north coast.

GEODUCK FISHERY

GENERAL

The geoduck (Panope abrupta) fishery began in the south coast in 1976 and expanded to the north coast in 1980. The biology and history of the fishery in B.C. is reviewed in Harbo and Peacock, 1983 and Harbo, Hand, and Adkins, 1986. Though the standing stock of geoduck is estimated to be large, a conservative management approach is followed because of low growth and recruitment rates (Breen and Shields, 1983).

Table 6. Crab landings (Kg) by month and statistical area in northern B.C., 1987.

Statistical Area	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total	% Total
1	3,718	522	513	15,277	39,233	49,490	37,684	2,548	2,827	72,022	15,904	6,240	245,978	62.6
1*	6,274	3,076	3,850	21,563	50,094	39,551	8,747	4,389	9,616	49,049	16,784	2,654	215,647	54.9
2E	-	-	-	-	5	-	6	-	2,923	2,589	1,008	-	6,531	1.7
2W	-	-	-	-	-	-	5,110	-	-	-	-	-	5,110	1.3
Q.C.I. Total	3,718	522	513	15,277	39,238	49,490	42,800	2,548	5,750	74,611	16,912	6,240	257,619	65.6
													-	-
3	-	-	-	-	200	348	274	50	658	4,138	3,475	1	9,144	2.3
4	560	1,232	3,841	7,525	8,142	12,090	18,855	8,822	7,279	15,021	13,410	7,392	104,169	26.5
5	1,467	1,572	-	-	-	-	-	374	318	427	-	-	4,158	1.1
P.R.D. Total	2,027	2,804	3,841	7,525	8,342	12,438	19,129	9,246	8,255	19,586	16,885	7,393	117,471	29.9
6	-	858	-	-	-	395	-	-	-	6,044	3,883	-	11,180	2.8
7	-	-	-	-	110	-	-	-	-	-	583	-	693	0.2
8	29	-	-	-	880	588	-	-	-	827	-	-	2,324	0.6
9	-	-	-	207	309	-	286	-	-	-	-	-	802	0.2
10	-	-	765	881	314	-	258	-	51	582	-	-	2,851	0.7
C.C. Total	29	858	765	1,088	1,613	983	544	-	51	7,453	4,466	-	17,850	4.5
N.C. Total	5,774	4,184	5,119	23,890	49,193	62,911	62,473	11,794	14,056	101,650	38,263	13,633	392,940	
% by month	1.5	1.1	1.3	6.1	12.5	16.0	15.9	3.0	3.6	25.9	9.7	3.5		
B.C. Total	63,622	49,900	52,578	124,074	131,229	128,348	402,927	179,241	141,374	228,037	80,025	49,258	1,630,613	

* Data from D. Burnip, DFO, Masset.

Table 7. Crab landings (Kg) by month and statistical area in northern B.C., 1988.

Statistical Area	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total	% Total
1	2,794	3,426	5,920	13,895	47,893	59,062	46,003	10,865	26,572	85,033	46,890	4,038	352,391	67.7
1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2E	-	-	-	19	16	4,256	6,208	8,985	2,131	588	693	616	23,512	4.5
2W	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q.C.I. Total	2,794	3,426	5,920	13,914	47,909	63,318	52,211	19,850	28,703	85,621	47,583	4,654	375,903	72.2
3	5	-	-	-	-	2,913	5	11,838	14,280	9,163	10,138	7,071	52,976	10.6
4	2,155	3,383	5,081	7,311	2,672	3,917	19,047	5,521	5,881	5,371	12,785	3,920	77,044	14.8
5	-	-	-	-	-	-	-	-	-	-	-	132	132	0.0
P.R.D. Total	2,160	3,383	5,081	7,311	2,672	6,830	19,052	17,359	20,161	14,534	22,923	11,123	132,589	25.5
6	-	2,385	-	1,305	642	596	-	-	-	2,387	-	-	7,315	1.4
7	259	511	760	738	273	-	-	-	-	-	-	-	2,541	0.5
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	200	-	935	59	54	-	10	-	-	-	1,258	0.2
10	-	-	689	-	-	59	-	-	10	-	-	-	758	0.1
C.C. Total	259	2,896	1,649	2,043	1,850	714	54	-	20	2,387	-	-	11,872	2.3
N.C. Total	5,213	9,705	12,650	23,268	52,431	70,862	71,317	37,209	48,884	102,542	70,506	15,777	520,364	
% by month	1.0	1.9	2.4	4.5	10.1	13.6	13.7	7.2	9.4	19.7	13.5	3.0		
B.C. Total	49,839	48,911	44,737	75,383	82,769	174,560	321,318	146,159	163,214	239,680	112,118	73,119	1,531,807	

* Data from D. Burnip, DFO, Masset.

REGULATIONS

Annual harvest of geoduck is limited by area quotas of two types; calculated quotas based on harvestable bed area and a conservative estimate of annual yield (1%), and exploratory quotas providing fishing opportunities in unfished areas. Table 8 details quotas by area in 1987 and 1988 and annual quotas are compared in Table 9. Annual north coast quotas have increased as the documented harvest area increased and new exploratory areas are defined. There is a trend to further division of area quotas to protect preferred harvest areas.

Burnaby Narrows in area 2E remains the only area closed to commercial harvest in the north coast. Divers are restricted to depths greater than 10 ft below chart datum to protect herring spawn habitat.

A category "G" licence issued to a vessel is required to harvest geoduck by dive gear. The privilege to fish horse clam (Tresus sp) by dive is included in the "G" licence. The number of licences issued annually have been limited to 55 since 1981. P-licences permitting processing of geoduck at sea in north coast waters were issued to six vessels in 1987 and ten vessels in 1988.

LANDINGS

Geoduck landings and fishing effort (vessel days) by area in 1987 and 1988 are contained in Table 10 and annual landings for the period 1980 to present are contained in Table 11. Annual landings increased to 2,202 t and 2.026 t in 1987 and 1988, accounting for 37% and 44% of coastwide landings. P-licence vessels processed 473 t of geoduck in the north coast in 1987 and 490 t in 1988. Annual catches often exceed quotas (see Table 10) as a result of high catch rates and few management controls on the fishery. The north coast fishery continues to be focused during the early months of the year with harvest largely complete by July (Tables 12 and 13). Fishermen are compelled to vigorously compete in order to take advantage of preferred fishing areas and to minimize operating costs.

The number of vessels fishing geoduck in the north coast increased from 24 in 1985 to 29 in 1987 and 39 in 1988. The landed value of geoduck, the highest of north coast shellfish fisheries, was $1.9 and $4.1 million in the two years. The increase in annual value reflects a doubling in unit price from less than $1/kg in 1987 to $2/kg in 1988 (Table 2).

Landings of horse clams have been negligible in the north coast dive fishery.

Table 8. Geoduck Quotas by management area in the north coast for 1987 and 1988.

1987

		(lb)	(mt)
Area 1		250,000	113.4
Area 2E	(Cumshewa Inlet)	210,000	95.3
	(Juan Perez Sound)	200,000	90.7
	(Skincuttle Inlet - CSJ)	175,000	79.4
Area 2W	(North)	150,000	68.0
	(South)	250,000	113.4
Area 3		250,000	113.4
Area 4		200,000	90.7
Area 5		350,000	158.8
Area 6	(Camaano Sound)	250,000	113.4
	(Aristazabel Island)	250,000	113.4
	(Kitasu - Higgins)	250,000	113.4
Area 7	(Spider - Kildidt)	200,000	90.7
	(other)	250,000	113.4
Area 8		60,000	27.2
Area 9,10	(Smith, Rivers Inlets)	250,000	113.4
Total North Coast		3,545,000	1608.0

1988

		(lb)	(mt)
Area 1		250,000	113.4
Area 2E	(Skidegate Inlet)	100,000	45.4
	(Cumshewa Inlet)	180,000	81.6
	(Juan Perez Sound)	170,000	77.1
Area 2	(Skincuttle and South 2W)	250,000	113.4
Area 2W	(North)	150,000	68.0
Area 3		250,000	113.4
Area 4		200,000	90.7
Area 5		350,000	158.8
Area 6	(Estevan - Camaano Sound)	250,000	113.4
	(Outer Aristazabel Is.)	200,000	90.7
	(Inside Laredo Sound)	75,000	34.0
	(Inside Aristazabel Is., outer Laredo Sd. and Milbanke)	300,000	136.1
Area 7	(Goose Is. to Kildidt)	300,000	136.1
	(rest of area 7)	200,000	90.7
Area 8	(Kelpie Pt.)	150,000	68.0
	(Upper Fitz Hugh Sound)	250,000	113.4
Total North Coast		3,625,000	1644.3

Table 9. Annual Geoduck quotas (kg) in northern B.C., 1980 - 1988.

Year	Statistical Area 1	2E	2W	3	4	5	6	7	8	9	10	Total
1980												1,587,600
1981	181,400		90,700	181,400			158,800		158,800	136,100		907,200
1982												907,200
1983		294,800			158,800				453,600			907,200
1984	a	294,800	a		158,800				453,600			907,200
1985	a	294,800	a			226,800			385,600			907,200
1986	113,400	204,100	294,800	113,400	113,400	158,800	113,400	249,500		113,400		1,474,200
1987	113,430	265,426	181,488	113,430	90,744	158,802	340,290	204,174	27,223	113,430		1,608,439
1988	113,430	385,000		113,430	90,744	158,802	374,319	226,860	181,488			1,644,737

a Exploratory area, no quota.

Table 10. Geoduck landings (kg) by statistical area in northern B.C., 1987 and 1988.

Statistical Area	1987				1988			
	Total Landings	% Total Landings	% Total Quota	No. Days Fished	Total Landings	% Total Landings	% Total Quota	No. Days Fished
1	136,473	6.2	8	103	118,821	5.7	7	22
2E	391,010	17.8	24	215	461,512	22.2	28	162
2W	179,247	8.1	11	98	45,239	2.2	3	11
Q.C.I. Total	706,730	32.1	44	416	625,572	30.1	38	195
3	134,153	6.1	8	119	76,754	3.7	5	44
4	95,435	4.3	6	78	149,977	7.2	9	60
5	337,398	15.3	21	139	191,405	9.2	12	146
P.R. Total	566,986	25.7	35	336	418,136	20.1	25	250
6	488,538	22.2	30	297	423,185	20.4	26	208
7	221,624	10.1	14	123	308,970	14.9	19	101
8	91,003	4.1	6	54	250,218	12.0	15	70
9	11,003	0.5	1	6	0	0.0	0	1
10	116,701	5.3	7	123	0	0.0	0	0
C.C. Total	928,868	42.2	58	603	982,373	47.3	60	380
N.C. Total	2,202,584	100.0	137	1,355	2,026,081	100.0	123	825

Table 11. Annual geoduck landings by statistical area in northern B.C., 1980 - 1988.

Statistical Area	Geoduck landings (tonnes) by year								
	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	-	-	-	-	-	-	6	136	119
2E	31	11	-	-	4	342	254	391	462
2W	-	-	-	-	-	214	325	179	45
3	-	-	-	-	3	-	120	134	77
4	4	-	-	-	-	-	125	95	150
5	-	84	-	-	214	291	323	287	191
6	-	6	-	-	8	60	24	484	423
7	-	370	227	207	109	494	392	222	309
8	-	18	-	294	183	37	2	91	250
9	28	-	-	-	54	-	103	11	0
10	5	20	-	-	-	-	17	117	0
North B.C.	68	509	227	501	575	1,438	1,691	2,148	2,026
W.C. Van Isl	35	547	409	570	1,174	1,055	1,108	2,339	1,564
E.C. Van Isl	63	1,648	2,498	1,669	2,879	2,879	2,194	1,193	977

Table 12. Geoduck landings (Kg) by month and statistical area in northern B.C., 1987.

Statistical Area	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total	% Total
1	-	-	-	-	3,700	132,773	-	-	-	-	-	-	136,473	6.4
2E	-	-	-	146,800	231,757	12,453	-	-	-	-	-	-	391,010	18.2
2W	-	-	-	-	179,247	-	-	-	-	-	-	-	179,247	8.3
G.C.I. Total	-	-	-	146,800	414,704	145,226	-	-	-	-	-	-	706,730	32.9
3	-	-	36,154	97,999	-	-	-	-	-	-	-	-	134,153	6.2
4	2,534	54,792	38,109	-	-	-	-	-	-	-	-	-	95,435	4.4
5	2,285	11,135	176,732	97,197	-	-	-	-	-	-	-	-	287,349	13.4
P.R.D. Total	4,819	65,927	250,995	195,196	-	-	-	-	-	-	-	-	516,937	24.1
6	-	142,456	82,802	258,812	-	-	-	-	-	-	-	-	484,070	22.5
7	-	104,227	117,396	-	-	-	-	-	-	-	-	-	221,623	10.3
8	1,619	67,260	22,124	-	-	-	-	-	-	-	-	-	91,003	4.2
9	-	-	4,230	6,773	-	-	-	-	-	-	-	-	11,003	0.5
10	-	-	-	-	9,780	91,078	15,843	-	-	-	-	-	116,701	5.4
C.C. Total	1,619	313,943	226,552	265,585	9,780	91,078	15,843	-	-	-	-	-	924,400	43.0
N.C. Total	6,438	379,870	477,547	607,581	424,484	236,304	15,843	-	-	-	-	-	2,148,067	
% by Month	0.3	17.7	22.2	28.3	19.8	11.0	0.7	-	-	-	-	-		
B.C. Total	171,982	642,808	922,637	1,329,532	893,755	424,216	238,125	302,166	413,434	206,662	181,900	7,254	5,734,471	

Table 13. Geoduck landings (Kg) by month and statistical area in northern B.C., 1988

Statistical Area	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total	% Total
1	-	-	-	-	-	45,363	73,458	-	-	-	-	-	118,821	5.9
2E	-	-	-	94,238	-	274,727	23,793	68,754	-	-	-	-	461,512	22.8
2W	-	-	-	-	-	18,992	26,247	-	-	-	-	-	45,239	2.2
G.C.I. Total	-	-	-	94,238	-	339,082	123,498	68,754	-	-	-	-	625,572	30.9
3	11,589	7,898	4,238	53,029	-	-	-	-	-	-	-	-	76,754	3.8
4	18,655	131,322	-	-	-	-	-	-	-	-	-	-	149,977	7.4
5	157,451	33,954	-	-	-	-	-	-	-	-	-	-	191,405	9.4
P.R. Total	187,695	173,174	4,238	53,029	-	-	-	-	-	-	-	-	418,136	20.6
6	-	-	423,185	-	-	-	-	-	-	-	-	-	423,185	20.9
7	-	-	308,970	-	-	-	-	-	-	-	-	-	308,970	15.2
8	5,922	-	10,756	108,140	125,400	-	-	-	-	-	-	-	250,218	12.3
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C.C. Total	5,922	-	742,911	108,140	125,400	-	-	-	-	-	-	-	982,373	48.5
N.C. Total	193,617	173,174	747,149	255,407	125,400	339,082	123,498	68,754	0	0	0	0	2,026,081	100.0
% by month	0.2	14.5	9.3	23.5	7.3	18.2	0.4	0.0					100.0	
B.C. Total	641,645	747,032	1,408,553	364,415	22,760	488,746	250,937	99,797	168,493	356,471	9,222	9,119	4,567,190	

OCTOPUS FISHERY

REGULATIONS

A category "Z" licence is required to harvest octopus (Octopus dolfleini) from shore, or by trap or dive from a vessel. Regulation prohibits the use of sharp pointed instruments, any chemicals in the intertidal zone, or copper sulphate in all waters.

LANDINGS

Bernard, 1982 and Farlinger and Bates, 1985 report octopus landings in B.C. from 1961 to 1984. A total of 28 t and 41 t were landed in the north coast in 1987 and 1988; equal to 20% of coastwide landings (Tables 14 and 15). The directed dive fishery in the south coast harvests a large portion of the total B.C. catch; however, this fishery has not developed in the north coast where most of the octopus is taken incidentally in groundfish trawl and prawn trap fisheries.

SCALLOP FISHERY

SPECIES HARVESTED

The three species of scallops licensed for commercial fishing are pink scallop (Chlamys rubida), spiny scallop (Chlamys hastata), and weathervane scallop (Pectin patinopectin). In addition, the rock scallop (Crassadoma gigantea) is taken in the sport dive fishery.

REGULATIONS

The scallop fishery is permitted for dive and drag under the authority of "Z" licences (category B for weathervane, category I for pink and spiny). Scallop drags are limited to a width of 2 m. There is a minimum size limit of 120 mm shell height for weathervane scallops. Harvestable abundances of weathervane scallops are reported in area 1, but this area is closed to dragging. The entire north coast remains closed to the harvest of pink and spiny scallops because of PSP.

LANDINGS

Total B.C. scallop landings in 1987 and 1988 were 65 t and 60 t, most of the landings from the dive fishery. Landings reported in the north coast were limited to 53 kg landed by dive in 1988.

Table 14. Octopus landings (kg) by statistical area and gear type in northern B.C., 1987.

Statistical Area	Gear Type				Total Landing	% Total Landing
	Diving	Trap	Trawl	Other		
1	-	100	100	-	200	0.7
2E	-	300	2,000	500	2,800	10.1
2W	300	-	-	-	300	1.1
3	-	200	-	200	400	1.4
4	200	-	3,500	200	3,900	14.1
5	400	-	11,700	300	12,400	44.9
6	200	700	500	500	1,900	6.9
7	-	600	-	700	1,300	4.7
8	-	1,300	900	1,400	3,600	13.0
9	-	200	-	-	200	0.7
10	-	400	-	200	600	2.2
North Total	1,100	3,800	18,700	4,000	27,600	
% Total	4.0	13.8	67.8	14.5		
B.C. Total	95,400	8,800	21,000	5200	130,400	

Table 15. Octopus landings (kg) by statistical area and gear type in northern B.C., 1988.

Statistical Area	Gear Type				Total Landing	% Total Landing
	Diving	Trap	Trawl	Other		
1	3,449	121	126	87	3,783	9.3
2E	-	32	4,844	832	5,708	14.1
2W	-	-	-	-	-	-
3	-	159	-	456	615	1.5
4	-	73	4,315	79	4,467	11.0
5	1,134	-	11,617	236	12,987	32.0
6	333	1,377	987	170	2,867	7.1
7	-	2,024	-	17	2,041	5.0
8	-	5,793	1,021	38	6,852	16.9
9	-	439	-	-	439	1.1
10	-	762	-	7	769	1.9
North Total	4,916	10,780	22,910	1,922	40,528	
% Total	12.1	26.6	56.5	4.7		
B.C. Total	160,775	16,967	28,393	3,191	209,326	

SQUID FISHERY

REGULATIONS

Squid (Loligo opalescens) is licensed under "Z" category E, for fishing by seine and by hook and line gear.

LANDINGS

Table 16 gives north coast squid landings by area and gear type for 1987 and 1988. Total B.C. squid landings were 86 t and 88 t in these two years; north coast landings were negligible. Most of the squid is reported to be sold as bait.

SEA URCHIN FISHERY

SPECIES HARVESTED

Three sea urchin species are harvested in B.C.: red urchin (Strongylocentrotus franciscanus), green urchin (S. droebachiensis), and purple urchin (S. purpuratus), though red urchins are presently the target species in the north coast.

REGULATIONS

In 1987, the only restriction on the north coast red urchin fishery was a minimum size limit of 100 mm, while the south coast fishery was limited by time and area quotas. In 1988, a maximum size limit of 140 mm was introduced in the north coast but no area restrictions, except for an allocation closure in Burnaby Narrows (area 2E). As catch information becomes available from this fishery, a rotational plan will be implemented in combination with minimum and maximum size limits.

Red and green urchins are fished by dive under authority of a "Z" licence, category C for red and A for greens. Experimental permits are issued to fish for purple urchins.

LANDINGS

Minor red urchin landings were first made in the north coast in 1986, increasing to 293 t in 1987 and 437 t in 1988 (Tables 17 and 18). The number of vessels fishing in the north coast increased from 16 to 26 in the two year period (Table 2). Fishing was focused in the central coast area 7 in both years because of the proximity to south coast plants. No significant amounts of urchin have been processed to date in the north coast. The north coast fishery had a landed value of $141 thousand in 1987 and $188 thousand in 1988.

Table 16. Squid landings (kg) by statistical area and gear type in northern B.C., 1987 and 1988

Statistical Area	1987				Statistical Area	1988			
	Gear Type	Landings (kg)	% of north	% of B.C.		Gear Type	Landings (kg)	% of north	% of B.C.
1	Trawl	257	95.9	0.3	1	Trawl	194	6.8	0.2
2E	Seine	-	-	-	2E	Seine	-	-	-
2W	Seine	-	-	-	2W	Trawl	64	2.2	0.1
4	Trawl	-	-	-	4	Trawl	-	-	-
7	Seine	11	4.1	0.0	7	Seine	-	-	-
8	Seine	-	-	-	8	Seine	753	26.2	0.9
					9	Seine	1,860	64.8	2.1
North Total	Seine	11	4.1	0.0	North Total	Seine	2,613	91.0	3.0
	Trawl	257	95.9	0.3		Trawl	258	9.0	0.3
	All Gear	268				All Gear	2,871		
B.C. Total	All Gear	85,817			B.C. Total	All Gear	88,274		

Table 17. Red Sea Urchin landings (Kg) by month and statistical area in northern B.C., 1987.

Statistical Area	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total	% Total
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2E	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2W	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q.C.I. Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	8,062	14,976	62	-	-	-	23,100	7.9
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P.R.D. Total	-	-	-	-	-	-	8,062	14,976	62	-	-	-	23,100	7.9
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	31,423	107,142	40,517	-	179,082	61.0
8	-	-	-	-	-	-	-	-	66,619	24,673	-	-	91,292	31.1
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C.C. Total	-	-	-	-	-	-	-	-	98,042	131,815	40,517	-	270,374	92.1
N.C. Total	-	-	-	-	-	-	8,062	14,976	98,104	131,815	40,517	-	293,474	
% by Month	-	-	-	-	-	-	2.7	5.1	33.4	44.9	13.8	-		
B.C. Total	171,982	642,808	922,637	1,329,532	893,755	424,216	238,125	302,166	413,434	206,662	181,900	7,254	5,734,471	

Table 18. Red Sea Urchin landings (Kg) by month and statistical area in northern B.C., 1988.

Statistical Area	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total	% Total
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2E	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2W	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q.C.I. Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	39,012	33,498	68	-	-	-	-	72,578	16.6
5	81	-	-	-	-	-	11,319	-	-	-	-	-	11,400	2.6
P.R.D. Total	81	-	-	-	-	39,012	44,817	68	-	-	-	-	83,978	19.2
6	-	-	-	-	-	-	-	-	-	-	-	7,317	7,317	1.7
7	-	-	13,216	46,103	211,490	38,978	4,388	-	-	-	-	-	314,175	71.9
8	-	-	31,587	-	-	-	-	-	-	-	-	-	31,587	7.2
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C.C. Total	-	-	44,803	46,103	211,490	38,978	4,388	-	-	-	-	7,317	353,079	80.8
N.C. Total	81	-	44,803	46,103	211,490	77,990	49,205	68	-	-	-	7,317	437,057	
% by Month	0.0	-	10.3	10.5	48.4	17.8	11.3	-	-	-	-	1.7	100.0	
B.C. Total	236,703	182,658	53,096	46,115	211,490	77,990	49,205	68	85,964	517,518	501,246	597,360	2,559,413	

* The only Green Sea Urchin landings in the north coast were 371 Kg landed in Area 10 in October.

SEA CUCUMBER FISHERY

REGULATIONS

The B.C. sea cucumber (Parastichopus californicus) fishery is restricted by annual area quotas totalling 1500 t, divided evenly between the north coast (areas 1 to 10), west coast of Vancouver Island (areas 20 to 27), and inside waters (areas 11 to 19, 28, and 29). A "Z" category D licence is required for this dive fishery. P-licences, for processing at sea, are issued for north coast waters only to vessels meeting inspection requirements.

LANDINGS

The fishery for sea cucumber began in south coast B.C. in 1980 and expanded to the north coast in the fall of 1986. Annual north coast landings by area and month are given in Tables 19 and 20. In 1987, a total catch of 422 t fell short of the 500 t quota but in 1988 the quota was exceeded by 80 t. In both years fishing was concentrated in central coast area 7. Fishermen were likely attracted to fish in the north coast by a substantial increase in price from $.30/kg in 1987 to $.45/kg in 1988, as well as high catch rates. The number of vessels participating in the fishery increased from 19 in 1987 to 30 in 1988 (Table 2). The total landed value of the north coast fishery was $190 thousand and $296 thousand in the two years. One P-licence fished in 1987, processing 210 t of sea cucumber. No P-licences were fished in 1988.

SHRIMP FISHERY

The shrimp fishery in B.C. utilizes six pandalid species and is fished by two different gear types, trap and trawl. The two fisheries target separate species and are sufficiently distinct that they will be discussed individually below.

SHRIMP BY TRAP FISHERY

SPECIES HARVESTED

The Prawn (Pandalus platyceros) is the target species in the trap fishery, though humpback shrimp (P. hypsinotus) and pink shrimp (P. borealis) are taken incidentally. Prawn are concentrated on rocky substrate in fjord-like inlets along the coast. Small trap fisheries targeting on humpback shrimp operate in Masset Inlet in area 1 and in Prince Rupert Harbour in area 4.

REGULATIONS

Shrimp are fished by trap under authority of a "Z" category H licence. Prawn management is based on maintaining a minimum number of ovigerous females per trap

Table 19. Sea Cucumber landings (Kg) by month and statistical area in northern B.C., 1987.

Statistical Area	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total	% Total
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2E	-	-	-	-	-	-	6,103	-	12,759	-	-	-	18,862	4.5
2W	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q.C.I. Total	-	-	-	-	-	-	6,103	-	12,759	-	-	-	18,862	4.5
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	600	2,135	226	227	3,188	0.8
5	-	-	-	-	-	-	1,167	-	-	3,689	119	-	4,975	1.2
P.R.D. Total	-	-	-	-	-	-	1,167	-	600	5,824	345	227	8,163	1.9
6	-	-	-	-	-	-	-	-	-	4,204	-	-	4,204	1.0
7	-	-	-	-	-	-	-	-	-	22,003	103,859	250,056	375,918	89.1
8	-	-	-	-	-	-	-	-	-	-	3,366	11,177	14,543	3.4
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C.C. Total	-	-	-	-	-	-	-	-	-	26,207	107,225	261,233	394,665	93.6
N.C. Total	-	-	-	-	-	-	7,270	-	13,359	32,031	107,570	261,460	421,690	
% by Month	-	-	-	-	-	-	1.7	-	3.2	7.6	25.5	62.0		
B.C. Total	171,982	642,808	922,637	1,329,532	893,755	424,216	238,125	302,166	413,434	206,662	181,900	7,254	5,734,471	

Table 20. Sea Cucumber landings (Kg) by month and statistical area in northern B.C., 1988.

Statistical Area	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total	% Total
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2E	-	-	-	1,372	-	-	-	-	-	-	-	-	1,372	0.2
2W	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q.C.I. Total	-	-	-	1,372	-	-	-	-	-	-	-	-	1,372	0.2
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	479	-	-	17,192	-	-	-	-	-	-	-	-	17,671	3.0
5	174	-	-	-	-	-	-	-	-	-	-	-	174	0.0
P.R.D. Total	653	-	-	17,192	-	-	-	-	-	-	-	-	17,845	3.1
6	49,134	39,516	31,359	-	-	-	-	-	-	-	-	-	120,009	20.7
7	168,075	68,546	40,979	142,809	2,692	-	-	-	-	-	-	-	423,101	73.0
8	-	-	6,812	10,480	-	-	-	-	-	-	-	-	17,292	3.0
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C.C. Total	217,209	108,062	79,150	153,289	2,692	-	-	-	-	-	-	-	560,402	96.7
N.C. Total	217,862	108,062	79,150	171,853	2,692	-	-	-	-	-	-	-	579,619	
% by Month	37.6	18.6	13.7	29.6	0.5	-	-	-	-	-	-	-		
B.C. Total	385,050	365,836	382,800	671,344	116,304	-	-	-	-	-	-	-	1,921,334	

Table 21. Commercial sampling summary for northern B.C. shrimp trap fishery, 1987 and 1988.

Date	Stat Area	Location	Spawn Index	Mean Length by Sex Stage (mm)		
				Male	Trans.	Female
06-MAY-87	3	WORK CHANNEL	2.09	35.6	41.8	34.0
19-OCT-88	3	QUOTOON	1.33	35.6	40.0	45.5
19-OCT-88	3	WORK CHANNEL	0.17	41.0	nil	46.9
19-OCT-88	3	WORK CHANNEL	1.83	37.9	41.3	47.3
20-OCT-88	3	WORK CHANNEL	0.50	35.0	38.2	48.4
20-OCT-88	3	WORK CHANNEL	2.33	38.9	42.4	47.1
20-OCT-88	3	WORK CHANNEL	2.83	38.9	40.1	47.7
20-OCT-88	3	WORK CHANNEL	1.60	38.3	nil	48.3
25-OCT-88	3	QUOTOON	9.92	nil	nil	nil
25-OCT-88	3	QUOTOON	3.00	nil	nil	nil
25-OCT-88	3	WORK CHANNEL	0.42	nil	nil	nil
25-OCT-88	3	WORK CHANNEL	1.00	nil	nil	nil

(spawner index), requiring catch sampling during a fishery. Table 21 contains a summary of sampling information for 1987 and 1988. Further management controls were implemented in 1988, including a minimum size limit (carapace length) of 30 mm and trap modifications providing escapement for undersize prawns. A three month closure implemented from January to April in the south coast, has not been implemented in the north coast.

LANDINGS

Annual catch and effort continue to increase in the prawn trap fishery. North coast landings and effort from 1981 to 1988 are contained in Table 22. Landings have increased from 103 t in 1985 to 165 t in 1987 and 239 t in 1988 while fishing effort has increased from 1,939 days in 1985 to 2,958 days in 1988. The majority of the north coast catch (80%) is taken in the central coast inlets, especially in areas 6, 7, and 8 (Tables 24 and 25). Vessels fishing the north coast have increased significantly from 28 in 1985 to 59 in 1987 and 72 in 1988. The prawn fishery, valued at $1.2 million and $2.0 million in the two years, is ranked third in annual value of north coast shellfish fisheries.

SHRIMP BY TRAWL FISHERY

SPECIES HARVESTED

This fishery targets mainly on side-stripe shrimp (Pandalus dispar) and pink shrimp (P. borealis) with both species commonly found over muddy bottom. Prawn and humpback shrimp are caught in much smaller numbers depending on the substrate.

REGULATIONS

A limited "S" licence is required to fish shrimp by trawl. The licence is vessel based and issuance is limited to 247 licences annually in B.C.. Two trawl types are employed in the fishery. The smaller beam trawl is towed more slowly and therefore produces a correspondingly smaller incidental catch.

LANDINGS

Annual landings and vessel days fished in the north coast and in all of B.C. are given in Table 23. Annual fluctuations in landings shown in the table likely reflect natural fluctuations in shrimp abundance and the response of fishermen to available abundances. North coast landings declined from 42 t to 26 t between 1987 and 1988 and there was a similar decline in vessel days fished, from 479 to 339. Chatham Sound in area 4 is one of the three major shrimp fishing areas in B.C. and the focus of north coast shrimp fishing (Tables 24 and 25). The number of vessels fishing the north coast increased from 29 in 1986 to 36 in 1987 and 37 in 1988 (Table 2). The total value of the fishery was $119 thousand in 1987 and $138 thousand in 1988 (Table 1).

Table 22. Annual landings (tonnes) and effort for shrimp trap fishery in B.C., 1981-1988.

Year	Northern B.C.		Total B.C.	
	Landings (tonnes)	Boat Days	Landings (tonnes)	Boat Days
1981	116	1,052	358	7,221
1982	71	1,718	281	7,248
1983	120	2,020	359	7,644
1984	92	1,553	398	9,117
1985	103	1,939	525	10,668
1986	139	1,648	582	10,622
1987	165	2,732	639	13,229
1988	239	2,958	725	13,268

Table 23. Annual landings (tonnes) and effort for shrimp trawl fishery in B.C., 1981-1988.

Year	Northern B.C.		Total B.C.	
	Landings (tonnes)	Boat Days	Landings (tonnes)	Boat Days
1981	19	305	582	3,612
1982	25	383	407	4,284
1983	17	419	382	6,714
1984	28	432	366	5,666
1985	30	560	667	5,200
1986	36	724	736	4,494
1987	42	479	2,623	7,279
1988	26	339	2,555	5,923

Table 24. Shrimp trap and trawl landings (kg) by statistical area in northern B.C., 1987.

Statistical Area	Trap		Trawl	
	Landings (kg)	% North Landings	Landing (kg)	% North Landings
1	2,767	1.7	5,037	12.1
2E	1,916	1.2	485	1.2
2W	-	-	860	2.1
Q.C.I. Total	4,683	2.8	6,382	15.3
		-		-
3	13,000	7.9	2,205	5.3
4	8,815	5.3	19,288	46.3
5	3,484	2.1	5,546	13.3
P.R.D. Total	25,299	15.3	27,039	64.9
		-		-
6	20,714	12.5	7,510	18.0
7	41,626	25.2	-	-
8	41,038	24.8	62	0.1
9	22,038	13.3	-	-
10	9,993	6.0	683	1.6
C.C. Total	135,409	81.9	8,255	19.8
North Total	165,391		41,676	
B.C. Total	638,733		2,622,735	

Note: Prawns comprised 96% (613,897 Kg) of shrimp trap landings in B.C.

Table 25. Shrimp trap and trawl landings (kg) by statistical area in northern B.C., 1988

Statistical Area	Trap		Trawl	
	Landings (Kg)	% North Landings	Landings (Kg)	% North Landings
1	1,975	0.8	-	-
2E	3,697	1.5	1,718	6.6
2W	168	0.1	2,104	8.0
Q.C.I. Total	5,840	2.4	3,822	14.6
3	12,882	5.4	2,041	7.8
4	22,790	9.5	9,076	34.7
5	1,651	0.7	6,996	26.8
P.R. Total	37,323	15.6	18,113	69.3
6	40,693	17.0	1,551	5.9
7	81,889	34.2	-	-
8	38,262	16.0	145	0.6
9	17,992	7.5	860	3.3
10	17,242	7.2	1,660	6.3
C.C. Total	196,078	82.0	4,216	16.1
North Total	239,241		26,151	
B.C. Total	725,498		2,551,856	

Note: Prawns comprised 98% (714,308 Kg) of shrimp trap landings in B.C.

ABALONE FISHERY

The abalone (Haliotus kamschatkana) fishery in B.C. has been reviewed in a number of previous reports (Farlinger and Thomas, 1988; Sloan and Breen, 1988; Farlinger and Bates, 1985; Bates, 1984, 1985; Sprout, 1983; and Fedorenko and Sprout, 1982). Data for this section was obtained from fishermen's harvest logs unless otherwise noted.

REGULATIONS AND SURVEYS

The abalone fishery in B.C. is strictly regulated by both licensing and management constraints. Since 1980, participation in the fishery has been limited to 26 "E" licences, each assigned an equal portion of a coastwide quota. Fishermen are permitted to attach a maximum of four abalone licences to a single fishing vessel. Other management constraints include a minimum size limit of 100 mm shell length, allocation closures for Indian food and sport harvest, and a three month seasonal closure. Annual quotas were introduced in 1979 at 4,537 kg (10,000 lb) per vessel, and were gradually reduced to 1815 kg (4,000 lb) by 1985, where they have remained to date (Appendix 2). A "glaze allowance" of 7% landed weight was provided for abalone frozen at sea. The quota reductions were based primarily on results of biannual resurveys of abalone sites in areas 2E and 6. The most recent survey, conducted in area 2E in 1987, revealed no significant change in abalone abundance from the previous survey of this area in 1984 (Carolsfeld, et al, 1988). For this reason, abalone quotas were not varied in 1987 and 1988.

Abalone were measured in a port sampling program, initiated in Prince Rupert in 1982. Mean size of abalone sampled was 115 mm in 1987 and 111 mm in 1988, both means well above the 100 mm legal minimum (Appendix Table 4). Mean annual size landed has shown no significant trend.

In addition to the commercial fishery, abalone are taken in Indian food and recreational fisheries, by shore-picking at low tides, and by SCUBA diving. Recreational harvesters in the north coast are restricted to 12 abalone per day and a two day possession limit.

LANDINGS

Appendices 2 and 2-1 show annual abalone landings for the period from 1952 to 1988. Annual landings increased significantly in 1986, remained at elevated levels until the introduction of vessel quotas in 1979, then declined with corresponding reductions in quota. Total landings reported on harvest logs were 46.4 t in 1987 and 45.5 t in 1988, less than the total allowable catch of 47.2 t. Table 26 gives the range of landings per licence in 1987 and 1988. Table 27 compares landings by area reported on harvest logs and sales slips for the two years. Differences in landings reported by sales slips and logs result from misreporting of catch on sales slips and from varying glaze allowances used at processing plants. The

Table 26. Range in Abalone landings per licence in B.C., 1987 and 1988.

Range in Landings		1987		1988	
kg	lb(x1000)	No. licence holders	% licence holders	No. licence holders	% licence holders
0 - 454	(0 - 1)	0	0.0	0	0.0
455 - 907	(1 - 2)	1	3.8	0	0.0
908 - 1361	(2 - 3)	0	0.0	1	3.8
1362 - 1814	(3 - 4)	8	30.8	8	30.8
1814 - 2037	(4 - 4.5)	17	65.4	17	65.4
	Total	26		26	

Table 27. Abalone landings (kg) by statistical area (1 - 27) in B.C., 1987 and 1988

Statistical Area	1987			1988		
	Landings (logbook) (kg)	Landings (sales slip) (kg)	% B.C. landings (logbook)	Landings (logbook) (kg)	Landings (sales slip) (kg)	% B.C. landings (logbook)
1	4,504	4,500	9.7	6,244	8,346	13.7
2E	14,342	1,911	30.9	19,062	21,461	41.9
2W	3,130	1,100	6.7	1,441	-	3.2
3	1,952	2,000	4.2	4,438	3,229	9.8
4	238	1,000	0.5	760	1,046	1.7
5	2,041	4,100	4.4	1,168	2,637	2.6
6	10,783	7,700	23.2	4,884	5,303	10.7
7	-	-	-	2,714	2,683	6.0
8	-	-	-	-	-	-
9	-	-	-	-	-	-
10	-	-	-	64	-	0.1
North Total	36,990	22,311	79.7	40,775	44,705	89.6
11	-	-	-	95	153	0.2
12	3,915	3,600	8.4	3,077	2,988	6.8
20	2,138	2,300	4.6	358	414	0.8
24	2,666	2,800	5.7	1,178	662	2.6
25	-	-	-	-	-	-
27	693	500	1.5	-	-	-
South Total	9,412	9,200	20.3	4,708	4,217	10.4
B.C. Total	46,402	31,511		45,483	48,922	

major fishing area in 1987 and 1988 was area 2E, though significant landings were also made from areas 1 and 6. Appendix 5 gives annual landings by area from 1977 to 1988. Catches by area fluctuate annually as fishermen rotate their fishing efforts. Area 2E has continually supported a major portion of the fishery and large catches have also originated from area 6 in the late 1970's and early 1980's.

Annual effort and CPUE information is given in Appendix 3; effort and CPUE are summarized by area in Appendix 6. Licences have continued to be consolidated so that 26 licences were fished on 16 vessels in 1987 and 1988. There has been a similar reduction in divers participating, from 33 in 1980 to 21 in 1987 and 22 in 1988. Total catch per diver day has shown a general declining trend since 1977 and remains at relatively low levels in 1987 and 1988 (Appendix 6-1).

Annual landings of abalone from the north coast were valued at $759 thousand in 1987 and $1 million in 1988, ranking fourth among shellfish (Table 2). Abalone landings are small relative to other species, but the landed value of the fishery is sustained by a unit price that is higher than any other species.

ACKNOWLEGEMENTS

The authors wish to thank Maureen Kostner and the staff of DFO's Statistics Division for providing catch statistics and Darlene Haugan for compiling the summary tables.

REFERENCES

Bates, K.T. 1984. Review of the 1982 commercial abalone fishery in British Columbia. Can. MS. Rep. Fish Auat. Sci. 1749:22 p.

Bates, K.T. 1985. Review of the 1983 commercial abalone fishery in British Columbia. Can. MS. Rep. Fish Auat. Sci. Aquat. Sci. 1826:25 p.

Bernard, F.R. (ed.) 1982. Assessment of invertebrate stocks off the West Coast of Canada (1981). Can. Tech. Rep. Fish. Aquat. Sci. 1074:iv+39 p.

Breen, P.A. and T.L. Shields. 1983. Age and size structure in five populations of geoduck clams (Panope generosa) in British Columbia. Can. Tech. Rep. Fish. Aquat. Sci. 1169:iv+62 p.

Butler, T.H. (in press). The dungeness crab (Cancer magister): its biology and utilization. Bull. Can. Fish. Aquat. Sci.

Butler, T.H. and J. Boutillier. 1983. Selected shrimp of British Columbia. Underwater World Factsheet, Communication Directorate, Department of Fisheries and Oceans, Ottawa, Ontario, K1A 0E6.

Carolsfeld, W., S. Farlinger, B.C. Kingzett, N.A. Sloan and G. Thomas. 1988. Abalone resurvey in the southeast Queen Charlotte Islands, June 1987 MS Rep. Fish. Aquat. Sci. 1966:90 p.

Farlinger, S. and K. Bates. 1985. Review of shellfish fisheries in Northern British Columbia to 1984. Can. MS. Rep. Fish. Aquat. Sci. 1841:vi+35 p.

Farlinger, S. and G. Thomas. 1988. Review of Shellfish Fisheries in Northern British Columbia during 1985 and 1986. Can. MS. Rep. Fish. Aquat. Sci. 1998:38 p.

Fedorenko, A.Y. and P.E. Sprout. 1982. Abalone biology, fishery regulations, commercial catch (1952-1980), and current state of resource in British Columbia. Can. MS. Rep. Fish. Aquat. Sci. 1658:74 p.

Harbo, R.M. and S.D. Peacock. 1983. The commercial geoduck clam fishery in British Columbia, 1976-1981. Can. MS. Rep. Fish. Aquat. Sci. 1712:vii+40 p.

Harbo, R.M., C.M. Hand and B.E. Adkins. 1986. The commercial geoduck clam fishery in British Columbia, 1981 to 1984. Can. MS Rep. Fish. Aquat. Sci. 1873:viii+59 p.

Jewett, S.C., N.A. Sloan, and D.A. Somerton. 1985 Size at sexual maturity and fecudity of the fjord-dwelling golden king crab Lithodes aequispina Benedict from Northern British Columbia. Journal of Crustacean Biology. 5(3):377-385.

Quayle, D.B. and N. Bourne. 1972. The clam fisheries of British Columbia. Fish. Res. Board Can. Bull. 179:70 p.

Sloan, N.A., and P.A. Breen. 1988. Northern Abalone, Haliotis kamtschatkana, in British Columbia: fisheries and synopsis of life history information. Can. Spec. Publ. Aquat. Sci. 103:46 p.

Sprout, P.E. 1983. Review of 1981 commercial abalone fishery in British Columbia. Can. MS. Rep. Fish. Aquat. Sci. 1692:23 p.

Appendix 1: North coast commercial crab closures, 1987 and 1988.

Area	Location	Type of Closure	Time
1987			
1-4	Naden Harbour	Closed to traps, rings only Soft shell	Annual year round May 1 to Sept 30
1-5	McIntyre Bay	Soft shell	Annual Jul 10 to Sep 21
2E	east side Q.C.I.	Sport & native food fishery	Annual year round
3-18	Iceburg Bay	Native food fishery	Annual year round
4-10	Pr. Rupert Harbour Porpoise Harbour	Sport & native food fishery Sport & native food fishery	Annual year round Annual year round
4-11	Morse Basin Wainwright Basin	Sport & native food fishery Sport & native food fishery	Annual year round Annual year round
6-1	Kitimat Arm	Sport & native food fishery	Annual year round
6-2	Hartley Bay	Native food fishery	Apr 30 to Oct 1
8-3	Koeye Bay	Sport & native food fishery	Annual year round
8-7	Cousins In. portion	Sport fishery	Annual year round
8-13	Lower Burke Chan.	Sport & native food fishery	Annual year round
9-2,3,4,10	Johnston, Goose, Allard & Draney Cr. Bays	Sport & native food fishery	Apr 30 to Oct 1
1988			
1-4	Naden Harbour	Closed to traps, rings only Soft shell	Annual year round May 1 to Sept 30
1-5	McIntyre Bay	Soft shell	Annual Jul 10 to Sep 21
2E & 2W	Q.C.I.	Sport & native food fishery	Annual year round
3-18	Iceburg Bay	Native food fishery	Annual year round
4-10	Pr. Rupert Harbour Porpoise Harbour	Sport & native food fishery Sport & native food fishery	Annual year round Annual year round
4-11	Morse Basin Wainwright Basin	Sport & native food fishery Sport & native food fishery	Annual year round Annual year round
6-1	Kitimat Arm	Sport & native food fishery	Annual year round
6-2	Hartley Bay	Native food fishery	Apr 30 to Oct 1
8-3	Koeye Bay	Sport & native food fishery	Annual year round
8-13	Lower Burke Chan.	Sport & native food fishery	Annual year round
9-2,3,4,10	Johnston, Goose, Allard & Draney Cr. Bays	Sport & native food fishery	Apr 30 to Oct 1

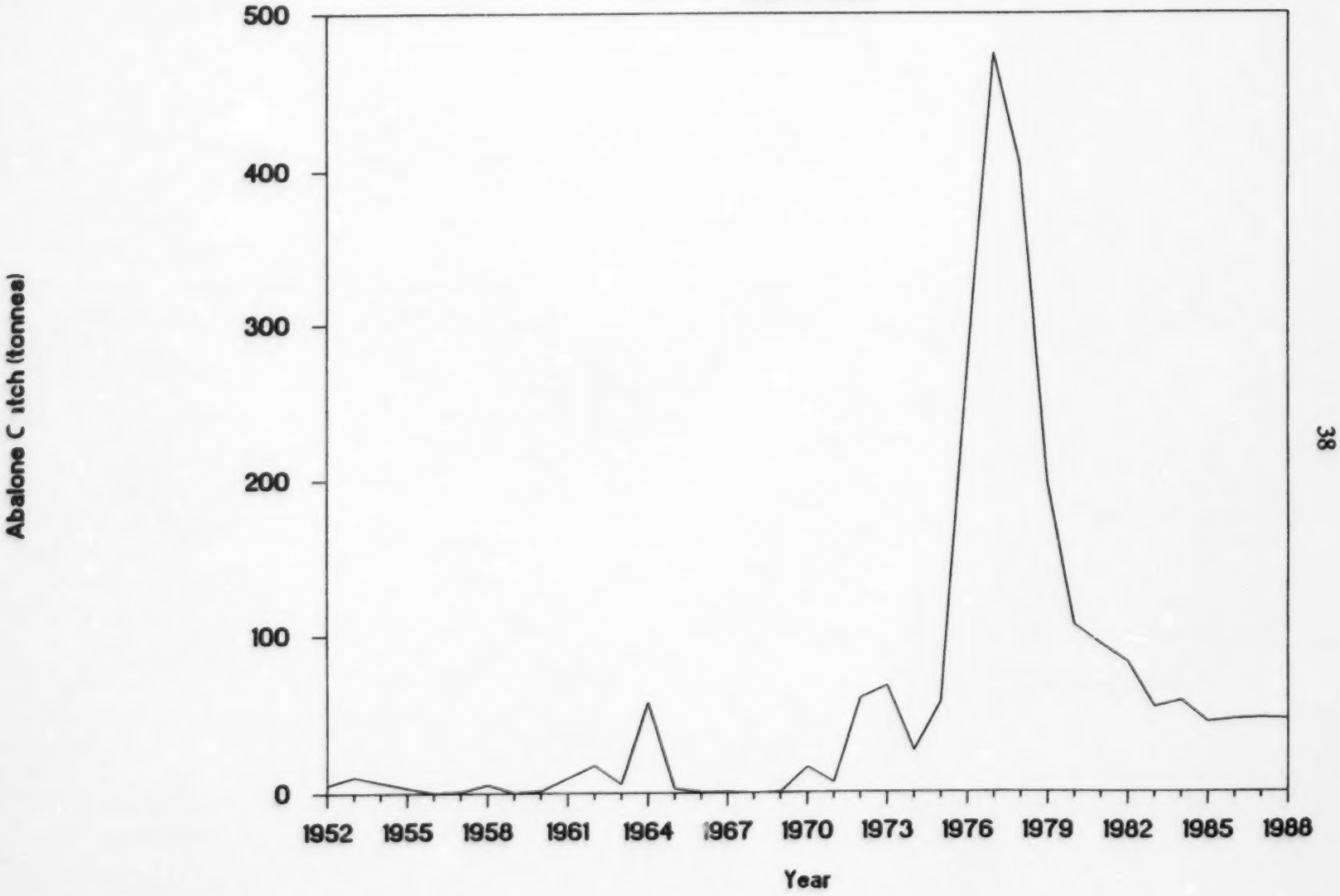
Appendix 2: Annual total abalone landings in B.C., 1952 to 1988.

Year	Quota	Landings	
	(kg)	(kg)	(lb)
1952		5,398	11,900
1953		10,342	22,800
1954		6,849	15,099
1955		3,538	7,800
1956		499	1,100
1957		953	2,101
1958		5,307	11,700
1959		181	399
1960		1,542	3,399
1961		9,389	20,699
1962		17,554	38,700
1963		5,715	12,599
1964		57,062	125,799
1965		3,084	6,799
1966		726	1,601
1967		862	1,900
1968		91	201
1969		635	1,400
1970		16,239	35,800
1971		6,441	14,200
1972		59,602	131,399
1973		67,132	147,999
1974		26,308	57,999
1975		56,699	124,999
1976		273,062	601,992
1977		474,803	1,046,750
1978		403,998	890,654
1979 *	113,000	197,230	434,813
1980	113,000	106,039	233,774
1981	94,000	93,651	206,463
1982	94,000	82,134	181,073
1983	71,000	53,263	117,424
1984	59,000	57,514	126,795
1985	47,000	43,777	96,511
1986	47,000	45,567	100,457
1987	47,000	46,402	102,298
1988	47,000	45,483	100,272
Total		2,285,071	5,037,666

* open fishery plus 4536 kg per licence vessel

Appendix Fig. 2-1. Annual Abalone Catch

1952 to 1988



Appendix 3: Mean annual abalone catch per vessel and diver, and fishing effort.

Year	1977	1978	1979 Total	1979 Open	1979 Quota	1980	1981	1982	1983	1984	1985	1986	1987	1988
No. Vessels	22	25	25	21	24	25	24	22	22	16	15	19	16	16
No. of divers	56	78	59	-	-	33	32	28	28	24	31	31	21	22
Mean Catch (kg)														
per vessel	21,582	16,160	8,352	5,190	4,159	4,129	3,902	3,733	2,543	3,579	2,918	2,398	2,900	2,843
per diver	8,479	5,180	3,539	-	-	3,128	2,927	2,933	1,998	2,386	1,412	1,470	2,210	2,067
No. of diver days per vessel														
Mean	109	86	54	31	29	32	29	27	21	30	30	25	29	27
Range	3-327	8-204	-	8-54	16-48	13-73	12-58	10-78	10-55	6-71	12-56	4-75	11-96	0-64
per diver														
Mean	43	28	23	-	-	25	22	22	16	20	14	14	22	20
Range	1-100	1-69	1-67	-	-	6-58	1-52	2-54	1-55	3-49	1-40	2-44	7-44	4-53
Catch per diver day														
Mean (kg/day)	199	187	155	-	-	131	142	136	124	118	100	96	104	106
Range of mean catch per diver day														
per vessel	72-340	49-585	-	49-585	62-282	70-349	67-325	58-301	34-634	14-195	22-189	49-182	51-164	0-213
per diver	32-763	5-385	23-278	-	-	40-349	35-287	28-301	34-634	14-195	18-189	17-181	101-323	44-470

Appendix 4. Annual abalone port sampling summary, Prince Rupert, B.C., 1987 and 1988

Date	Statistical Area	Sample Size	Mean Length (mm)	Standard Deviation (mm)	% Legal Size
1987					
Feb. 13	6	100	115	8.9	99
Mar. 4	1	100	118	9.6	99
Oct. 14	6	100	114	7.2	100
Nov. 18	2E	102	115	8.1	100
Dec. 14	3	105	117	5.9	100
Dec. 15	3	50	110	5.2	100
Total Sampled		557			
Overall Mean (mm)			115	8.0	100
1988					
Feb. 19	3&5	105	112	8.1	100
Mar. 10	3	101	114	7.8	99
Apr. 27	3	100	109	6.3	100
Oct. 13	2E&3	100	110	7.1	100
Nov. 1	3	65	108	6.0	95
Nov. 1	6	52	110	8.0	98
Nov. 2	6	100	112	10.2	99
Nov. 23	1	100	110	7.4	96
Total Sampled		723			
Overall Mean (mm)			111	7.6	98

Appendix 5: Annual abalone landings (Kg) (from logbooks) by statistical area in B.C., 1977 to 1988.

Statistical Area	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	Total
1	45,668	12,888	2,613	3,169	1,923	13,024	12,113	14,442	9,368	15,320	4,504	6,244	141,276
2E	251,669	102,431	29,528	12,538	21,321	13,539	17,935	12,670	4,409	6,453	14,342	19,062	505,897
2W	13,174	13,362	5,726	3,724	6,047	161	0	938	0	2,115	3,130	1,441	49,818
G.C.I. Total	310,511	128,681	37,867	19,431	29,291	26,724	30,048	28,050	13,777	23,888	21,976	26,746	696,990
3	10,186	254	0	2,143	0	1,667	0	3,181	3,407	738	1,952	4,438	27,966
4	0	6,388	2,928	2,692	5,186	1,383	875	236	539	1,815	238	760	23,040
5	94,586	88,289	40,408	13,483	2,858	2,201	3,970	4,990	3,663	3,534	2,041	1,168	261,191
P.R. Total	104,772	94,931	43,336	18,318	8,044	5,251	4,845	8,407	7,609	6,087	4,231	6,365	312,196
6	33,751	160,269	87,000	44,519	37,756	27,058	7,538	9,899	10,820	4,170	10,783	4,884	438,447
7	5,601	10,922	2,704	1,943	1,778	898	552	0	0	0	0	2,714	27,112
8	0	0	0	245	0	0	145	0	0	0	0	0	390
9	0	0	0	0	553	0	0	0	0	13	0	0	566
10	0	0	0	0	0	1,124	0	0	0	3,015	0	64	4,203
C.C. Total	39,352	171,191	89,704	46,707	40,087	29,080	8,235	9,899	10,820	7,198	10,783	7,662	470,718
11	186	0	5,548	1,001	1,828	3,541	0	0	0	45	0	95	12,244
12	9,135	459	17,312	14,047	9,595	5,052	2,452	3,270	5,545	8,349	3,915	3,077	82,208
19	0	0	0	0	0	0	0	0	0	0	0	0	0
20	1,430	3,026	924	2,004	4,805	8,604	7,684	6,593	3,776	0	2,138	358	41,342
21	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	1,000	0	0	0	0	0	0	1,000
24	180	0	0	0	0	18	0	0	0	0	2,666	1,178	4,042
25	4,554	5,718	577	0	0	0	0	389	1,964	0	0	0	13,202
26	2,332	0	209	0	0	0	0	0	0	0	0	0	2,541
27	2,361	0	1,756	0	0	2,866	0	907	287	0	693	0	8,870
S.C. Total	20,178	9,203	26,326	17,052	16,228	21,081	10,136	11,159	11,572	8,394	9,412	4,708	165,449
Unknown	0	0	0	4,507	0	0	0	0	0	0	0	0	4,507
B.C. Total	474,813	404,006	197,233	101,508	93,650	82,136	53,264	57,515	43,778	45,567	46,402	45,481	1,645,353

Appendix 6. Annual abalone fishing effort by statistical area (from harvest logs) in B.C., 1977 to 1988

Statistical Area	1977		1978		1979		1980		1981		1982	
	Total diver days	CPUE (kg/dd)	Total diver days	CPUE (kg/dd)	Total diver days	CPUE (kg/dd)	Total diver days	CPUE (kg/dd)	Total diver days	CPUE (kg/dd)	Total diver days	CPUE (kd/dd)
1	211	216.4	59	218.4	20	130.7	21	152.2	5	384.6	48	271.3
2E	1111	226.5	547	187.3	134	220.4	48	261.2	126	169.2	116	116.7
2W	75	175.7	80	167.0	63	90.9	21	177.3	34	177.9	1	161.0
QCI Total	1322	222.3	606	187.6	154	174.5	69	216.2	131	177.5	164	162.0
3	51	199.7	5	50.7	0	0.0	14	153.1	0	0.0	13	128.2
4	0	0.0	30	212.9	40	73.2	16	168.3	47	110.3	14	98.8
5	470	201.3	506	174.5	347	116.5	104	129.6	28	102.1	33	66.7
P.R. Total	521	201.1	541	175.5	387	112.0	134	136.7	75	107.3	60	87.5
6	251	134.5	761	210.6	449	198.2	381	116.9	264	143.0	186	145.5
7	51	109.8	101	108.1	27	100.1	32	60.7	24	74.1	5	179.6
8	0	0.0	0	0.0	0	0.0	2	122.5	0	0.0	0	0.0
9	0	0.0	0	0.0	0	0.0	0	0.0	3	184.5	0	0.0
10	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	11	102.1
C.C. Total	302	130.3	862	198.6	476	188.5	415	112.5	291	137.8	202	144.0
11	11	16.9	0	0.0	42	132.1	6	166.8	15	121.9	19	186.4
12	95	96.2	6	76.5	126	137.4	130	108.1	92	104.3	58	87.1
20	16	89.4	33	91.7	11	84.0	19	105.1	63	76.3	71	121.2
23	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	7	142.9
24	4	44.9	0	0.0	0	0.0	0	0.0	0	0.0	1	17.5
25	16	284.6	34	168.2	4	144.1	0	0.0	0	0.0	0	0.0
26	14	166.6	0	0.0	3	69.6	0	0.0	0	0.0	0	0.0
27	11	214.8	0	0.0	13	135.1	0	0.0	0	0.0	19	150.8
S.C. Total	167	120.8	73	126.1	199	132.3	155	110.0	170	95.5	175	120.5
Total	2312		2082		1216		773		667		601	
Mean (a)		198.9		186.9		154.2	+23	127.9	(b)	133.6		136.4

(a) Total catch/area/total diver days

(b) 4,507 kg of unknown fishing effort; CPUE based on remaining catch

Appendix 6. Continued

Statistical Area	1983		1984		1985		1986		1987		1988	
	Total diver days	CPUE (kg/dd)	Total diver days	CPUE (kg/dd)	Total diver days	CPUE (kg/dd)	Total diver days	CPUE (kg/dd)	Total diver days	CPUE (kg/dd)	Total diver days	CPUE (kg/dd)
1	62	195.4	104	136.5	78	120.1	147	104.2	50	90.1	77	81.1
2E	119	150.7	89	142.4	31	142.2	56	115.2	123	116.6	149	127.9
2W	0	0.0	16	58.6	0	0.0	18	117.5	24	130.4	8	180.1
QCI Total	181	166.0	193	134.2	109	126.4	203	88.1	197	337.1	234	389.1
3	0	0.0	30	106.0	30	113.6	11	67.1	38	51.4	45	98.6
4	13	67.3	4	59.0	9	59.9	20	90.8	2	119.0	10	76.0
5	35	113.4	49	101.8	35	104.7	34	103.9	19	107.4	13	89.9
P.R. Total	48	100.9	83	101.3	74	102.8	65	93.6	59	277.8	68	264.4
6	70	107.7	69	143.5	90	120.2	48	86.9	98	110.0	37	132.0
7	7	78.9	0	0.0	0	0.0	0	0.0	0	0.0	29	93.6
8	4	36.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
9	0	0.0	0	0.0	0	0.0	1	13.0	0	0.0	0	0.0
10	0	0.0	0	0.0	0	0.0	30	100.5	0	0.0	1	63.5
C.C. Total	81	101.7	69	143.5	90	120.2	79	91.1	98	110.0	67	289.1
11	0	0.0	0	0.0	0	0.0	1	45.0	0	0.0	1	95.3
12	26	94.3	35	93.4	82	67.6	111	75.2	41	95.5	40	76.9
20	91	84.4	78	84.5	66	57.2	0	0.0	33	64.8	6	59.7
23	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
24	0	0.0	0	0.0	0	0.0	0	0.0	29	91.9	13	90.6
25	0	0.0	3	129.6	19	103.4	0	0.0	0	0.0	0	0.0
26	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
27	0	0.0	8	113.3	3	95.7	0	0.0	10	69.3	0	0.0
S.C. Total	117	86.6	124	90.0	170	68.1	112	74.9	113	321.5	60	322.5
Total	427		469		443		459		467		430	
Mean (a)		124.7		118.6		98.8		95.5		99.4		105.9

Appendix Fig. 6-1. Annual Abalone CPUE